Columbia River Inter-Tribal Fish Commission

2004 River Operations Plan

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March 3, 2004

Overview

The Columbia River Inter-Tribal Fish Commission (CRITFC) presents the 2004 River Operations Plan (ROP) for the Federal Columbia River Power System (FCRPS), the Hells Canyon Complex and mid-Columbia FERC-licensed hydro-projects including Rock Island, Rocky Reach, Wanapum and Priest Rapids. The ROP is a detailed extension of the mainstem recommendations from the CRITFC tribes' Columbia River Anadromous Fish Restoration Plan, *Wy-Kan-Ush-Mi Wa-Kish-Wit* (Spirit of the Salmon; Nez Perce et al. 1995). The ROP contains recommendations for water management and dam operations, including flows, reservoir elevations, spill, and fish facility operations and is consistent with CRITFC's recommendations on the federal 2004 Water Management Plan.[1] The ROP also contains recommendations for water acquisition. Each of the recommended actions will contribute singularly and cumulatively to increase mainstem anadromous fish protection and survival. Current direct mortality and indirect mortality for Snake River yearling chinook is estimated between 25%-73% and 37%-68% respectively (Budy et al. 2002). If implemented, the recommended actions in this Plan will reduce these significant mortality rates.

Near historical levels of adult salmon escapement in 2002 and 2003 indicate that many juvenile salmon will be out-migrating this spring and summer through the mainstem Snake and Columbia River hydrosystem of 13 dams and reservoirs. For example, escapement estimates for Hanford Reach bright fall chinook indicate that over 30 million fry will outmigrate from the Reach spawning areas this spring and summer. Thus, it is critical that substantial anadromous fish productivity in 2004 be protected through the hydro-system by the implementation of the appropriate river operations contained in the ROP.

The USDA-Natural Resources Conservation Service and NOAA's National Weather Service forecast a 100 million acre feet (MaF) January-July runoff (February final forecast) for the Columbia River at The Dalles or 93% of normal for 2004. CRITFC staff, through independent analyses, forecast a 104 MaF runoff forecast (Table 1).[2]

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[1] These comments can be found in Attachment 5 to this document.

[2] CRITFC uses the experimental one-year streamflow forecast for the Columbia at The Dalles from the University of Washington's Climate Impacts Group (Hamlet and Lettenmaier 2003). That forecast is used in another regression analysis that accounts for the phase of the Pacific Decadal Oscillation. The 2004 runoff forecast compares to a 103 MaF average runoff at The Dalles during the 1929-2003 period of record.

The foundation of the ROP is a normative, natural peaking hydrograph that offers juvenile and adult salmon migrations a more natural flow regime to: 1) reduce time of entry into saltwater, 2) create enhanced water quality conditions in the mainstem and estuary and Columbia River near-ocean plume to enhance critical habitat, and 3) minimize predation and residualization losses (Williams et al.1996; Bunn and Arthington 2002). ROP water management is based upon judicious use of available storage and altered flood control modifications to create a peaking hydrograph in early June at the Columbia at The Dalles to assure flow and increase critical mainstem habitat for anadromous fish.

ROP operations were modeled against actual extant and probable future federal river operations for 2004, based upon the historical flow record and federal operations of the FCRPS since 1995, when the minimum flows of the Biological Opinion was first established. The Northwest Power Planning Council's GENESYS Hydro-regulation model (Version 2.7.1) was used to simulate recommended monthly flow and reservoir elevations at index points in the region.

The ROP uses altered flood control rule curves and additional upper basin storage to create a normative, peaking flow regime for all major river index points (Martin 2004). Peak flow frequency analysis (WY 1929-1978) suggest the average system-wide flood risk for the Columbia at The Dalles (550 kcfs) for the CRITFC plan is 16% versus 14% for Federal operations and 42% for historical observed data. For bankfull flows (450 kcfs), the system-wide flood risk for the Columbia at The Dalles for the CRITFC plan is 50% versus 42% for Federal operations and 62% for historical observed data. When they become available later this spring, the Northwest River Forecast Center's NWSRFS-STP hydro model results, in daily time steps, will be used to update and fine-tune the ROP for spring and summer operations.

The ROP is based upon restoring ecosystem functions and values and assures beneficial flows for anadromous fish, while seeking to maintain higher reservoir levels for resident fish and tribal cultural resource protection. The federal 2004 Water Management Plan lacks any reference to a basin-wide, ecosystem approach to increase productivity of listed and unlisted anadromous and resident fish. Spill is a major component of the ROP consistent with the normative river paradigm (Williams et al. 1996). The spill season in the ROP is extended and enhanced over that required in the NMFS 2000 Biological Opinion for the FCRPS and 2004 Water Management Plan in the spring and summer at most federal dams. The Plan's spring and summer spill recommendations extend spill timing and amounts for Rocky Reach, Rock Island and Priest Rapids and Wanapum dams. These spill levels are an enhancement over levels in the three Mid-Columbia Habitat Conservation Plans and current spill levels provided at Priest and Wanapum dams by Grant PUD.

The ROP also contains specific recommendations and guidelines to: 1) reduce power peaking, 2) enhance adult and kelt passage, 3) enhance water temperature criteria to meet Clean Water Act standards, 4) enhance river conditions for the tribal treaty fisheries, 5) enhance fish facility operations and 5) direct mainstem research. Also offered in the ROP is a list of key fish facility mitigation projects, which, if implemented, could result in significant improvements in fish passage survival. The ROP also offers a water management paradigm that avoids the

weaknesses of week-to-week trade offs common to the Technical Management Team, Implementation Team, and Regional Executive Committee forums.

The storage volume difference in ROP's altered flood control operation and the federal Water Management Plan's standard flood control operation is almost 15 MaF, distributed between Mica, Arrow, Libby, Grand Coulee, Brownlee, and Dworshak projects.[3] The ROP applies this storage to both spring and summer salmon migrants. The federal flood control drafts will likely result in a loss of storage that may impact spring flows and the ability to meet the April 10 refill requirement called for by the NMFS 2000 Biological Opinion for the FCRPS. For example, the federal flood control operations place Lake Roosevelt elevations 29 feet below its flood control rule curve for February 29th, which may reduce Hanford Reach spring flows and contribute to flow fluctuations and stranding losses. Dworshak is 21 feet below its February 29th flood control rule curve. The loss of this storage may also reduce the ability to 1) meet the April 10 refill requirement and, 2) meet McNary spring target flows called for by the NMFS' 2000 Biological Opinion for the FCRPS.

Tribal treaty fishing occurs in all of Zone 6 from McNary to Bonneville dams. The ROP includes water management regulations to promote the treaty fishery during the extremely limited fishing periods. Federal river operations should be restricted to fish and wildlife related actions, flood control and navigation actions. Recreational demands for pool operations during treaty fisheries are of a lower priority and should not conflict with the other actions. Pool elevation restrictions and steady flows should be provided during tribal fisheries for all of Zone 6, not just Bonneville Pool. The federal operators have a trust and treaty responsibility to provide these operations to insure that tribal fishers may successfully engage in the exercise of their fisheries.

Given the droughts in 2001 and 2003, and the extraordinary numbers of juvenile salmon migrating seaward through the hydro-system, it is critical that measures in the 2004 CRITFC River Operations Plan be fully implemented. CRITFC urges the federal government, Idaho Power Company, and the Mid-Columbia Public Utility Districts to seriously consider implementing the recommendations in this Plan.

[3] See Table 2. Results derived with GENESYS model.

Key Plan Recommendations

Decision Making

- The Technical Management Team (TMT) and Implementation Teams are useful for regional information sharing but they do not suffice for river operations decision-making and are not government-to-government forums. CRITFC's member tribes formally withdrew from TMT and other NMFS' ESA forums in 1997, due to the lack of formal government-to-government consultation mandated in various federal agency policies including the 1997 Secretarial Order to the Departments of Interior and Commerce. Further, the TMT is prevented from candid discussions of operational alternatives due to the presence of power marketing agents.[4] To avoid these serious problems, the federal operators and NMFS should use the Columbia Basin Fish and Wildlife Authority as a technical forum to discuss river operations where all 13 Columbia Basin tribes can have meaningful input. Disputed issues should be raised to an executive committee table comprised of policy representatives from the tribes and states and federal entities. Similarly, spill and flow decisions in the Mid-Columbia should be determined in the Mid-Columbia Coordinating Committees established by individual settlement agreements for Wells and Rock Island Projects and under the Mid-Columbia Proceedings established under existing licenses for Rocky Reach, and Priest-Wanapum Projects.

Emergency Declarations

- The definition of "emergency" and related procedures must be recast for 2004 to exclude any BPA financial problems. The definition of "emergency" must be based on unforeseen circumstances. Any power sales revenues accruing to BPA and attributable to an emergency operation must be set aside for salmon mitigation, where such amounts will be in addition to and not in- lieu of previously planned BPA expenditure levels.

Energy and Water Conservation

- Water and land acquisition programs begun in 2001 should be continued.

- BPA should renew the 1995-2001 contract with Idaho Power Company to allow flexibility in flow augmentation for fish through power exchanges.

[4] Many power-marketing representatives from private or public corporations attend TMT meetings. These representatives are present to learn of real-time federal operators' river operation plans, in order to maximize power-marketing arrangements. As a result, federal operators are hesitant to disclose vital information and make decisions for fishery management to the tribes, state and federal fishery managers in this forum. TMT was not burdened with this situation in the early years of its implementation, but now it is a serious obstacle to regional information sharing, and has greatly diminished and compromised the effectiveness of TMT.

Runoff Forecast

- A comparison using the University of Washington's Climate Impact Group's (CIG) Experimental One-Year forecast (Hamlet and Lettenmaier 2003), using their VIC Hydro Model, matches well with CRITFC's regression analysis (Table 1).

- Water supply forecast correction curves (Martin 2002) suggest a medium-high water year. Runoff in the CRITFC 2004 Plan is projected to be 104 MaF for the Columbia at The Dalles.

Table 1. UW-Climate Impact Group forecast for the Columbia at The Dalles for WY 2004.

	Number of Water Years Used:	Number of Water Years Used:	
	11	3	Unregulated
Initial Conditions	UW-CIG	**CRITFC**	Flow
WY1994	(KaF)	(KaF)	(kcfs)
oct	5597	5501	89
nov	6252	6030	101
dec	5631	5755	93
jan	5347	5069	82
feb	5588	6391	110
mar	7194	6255	101
apr	10310	10214	170
may	20142	17010	274
jun	32271	32062	534
jul	25124	23011	371
TOTAL:	**106.0**	**100.0**	
(Jan. - July)	(MaF)	(MaF)	
Regression:	**110.1**	**103.7**	

Flow and Reservoir Management

- Available storage and runoff should be shaped to meet natural peaking, normative hydrographs at Priest Rapids, Lower Granite, The Dalles and other index points (Attachment 1). The object is to provide flushing flows during the main portions of the juvenile and adult migrations and to leave as much storage as possible for resident fish and tribal cultural resource protection.

- In general, reservoirs are left at the end of the salmon migration season at or above elevations specified by the NMFS 2000 FCRPS Biological Opinion.

- Dworshak. Refill of Dworshak Reservoir by the end of June is a high priority (Attachment 1). The majority of flow should be dedicated to summer migrants and

temperature control to attempt to meet Clean Water Act standards in the Lower Snake River. Consistent with the Nez Perce Tribe-State of Idaho Plan, Dworshak should fill to mean sea level (msl) 1600 feet by June 30 for juvenile and adult summer migrants and temperature control. A draft to msl 1590 feet by July 31 may be needed to alleviate temperature problems in the lower Snake. Dworshak should draft to msl 1520 feet by September 30. Neither CRITFC nor the Nez Perce Tribe supports any drafts down to 1500 feet and this compromises refill for the next water year and exposes tribal cultural resources to theft and vandalism.

- Lower Granite Reservoir should be drawn down to msl 723 feet during June 20 - October 31 to decrease juvenile and adult travel time and to make increase the effectiveness of temperature control from Dworshak.

- Hells Canyon Complex. The 110 KaF described in the 1998 FERC Biological Assessment for the Hells Canyon Complex should augment Snake River spring flows in May. For summer flows in June and July, Brownlee should contribute an additional 237 KaF described in the 1998 Biological Assessment and should pass through all upper Snake storage in June-August in addition to the 237 KaF from Brownlee. Idaho Power Company is requested to follow plan recommendations and should continue negotiations with BPA concerning establishment of a power and water exchange contract (Attachment 3). NMFS should release a biological opinion for the Hells Canyon Complex that includes Plan recommendations, with or without power/water exchange contract.

- Upper Snake storage. An additional 450 KaF should be added to the 427 KaF required in the NMFS 2000 FCRPS Biological Opinion for a total of 877 KaF flow augmentation from the upper Snake from Bureau of Reclamation and Corps of Engineers upper Snake reservoirs. This water should be passed through the Hells Canyon Complex in a timely manner to augment July flows, before the water heats up.

- Lake Roosevelt. Reservoir flood control drafts should be restricted to msl 1260 feet during April, which allows runoff refill for spring flows, Hanford Reach juvenile out-migration protection and summer flows (Attachment 1). Lake Roosevelt is drafted to msl 1289 feet by July 31, drafted to 1280 by August 31, and fills to msl 1283 feet by late September for resident fish and cultural resources.

- Banks Lake. Storage of 260 KaF (10 foot draft at Banks Lake) should remain in Lake Roosevelt instead of being pumped into Banks Lake to provide additional flow augmentation for salmon in August and September.

- Canadian storage. Storage should be released in early spring in order to leave some storage in Lake Roosevelt for salmon migrants and energy needs (Attachment 1). An extra 500 KaF from Canadian Non-Treaty storage over the 1 MaF called for by the NMFS Biological Opinions should be allocated for downstream flows.

- The CRITFC 2004 Plan recommends that modified VAR-Q operations be implemented at Libby and Hungry Horse without compensating drafts of Lake Roosevelt (Attachment

1). This action would hold storage in upper basin reservoirs for later anadromous fish migrations and reduce impacts to resident fish.

- Libby. Storage should be managed for sturgeon flows (an operation is offered for late June and early July), downstream salmon migrations and resident fish needs by implementing modified VAR-Q operations and fills within one-foot of full by late July (Attachment 1). Libby should be drafted to avoid drafting Dworshak, which has substantial temperature control capacity in the lower Snake.

- Hungry Horse. Storage should be managed for salmon flows and resident fish needs by implementing modified VAR-Q operations. CRITFC operations leave the reservoir 1.4 feet from full by June 30 (Attachment 1). Minimum flows of 2.5 kcfs maintained through September would benefit Columbia Falls flows.

- Power peaking/load following. Should be restricted to: 1) avoid stranding of juvenile salmon in the Hanford Reach, 2) allow fish ladders and other fish passage facilities to operate within established criteria and protocols and 3) to allow proper conduct of tribal treaty fisheries.

- Meeting Clean Water Act standards for dissolved gas and temperature is a high priority. Juvenile salmon should be left in river to take advantage of cool water releases and to avoid high temperatures in screen and transportation systems.

Hanford Reach Flows

- Power peaking should be restricted to avoid stranding of Hanford Reach juvenile chinook, especially during the key fry susceptibility period (March 15 - June 10). Fluctuations during this period should not exceed specified criterion during each 24-hour period in the CRITFC 2004 Hanford Stranding Operations Recommendations. (Attachment 2). To accomplish these fluctuation reductions, all seven Mid-Columbia Projects should stay on Mid-Columbia Hourly Coordination during all of the early migration and susceptibility period. Grant PUD should fund and should cooperate with tribal and fishery agency 2004 Reach monitoring and evaluation efforts.

Spill

- Spill has been demonstrated to be the most effective and safest means of juvenile project passage (Fishery Managers 1994; FPAC 2003; Whitney et al. 1998; NPPC 1999). Spill also best protects the beneficial use under the Clean Water Act by providing salmon access to lower temperatures found at depth in the reservoirs instead of higher temperatures found in dam bypass and transportation systems. Spill also provides safer downstream passage for steelhead kelts and adults that fallback over dams than powerhouse routes.

- The ROP spill planning dates are March 20-September 15 (Snake) and March 20-September 30 (Columbia). The extended spill period accommodates early spring juvenile migrants and kelts. Analysis by the Fish Passage Center indicates that federal 2004 Water Management Plan spring spill planning dates are April 10- June 20 (Snake) or June 30 (Columbia). End dates include August 31 (Snake) and September 15 (Columbia).

- CRITFC recommends provision for summer spill at Lower Granite, Little Goose, Lower Monumental and McNary dams above the requirements of the NMFS' 2000 FCRPS Biological Opinion.

- CRITFC recommends provision for daytime spill at John Day, McNary and the Lower Snake River dams. When implemented, daytime spill at most dams has been demonstrated to be as successful, or more so, than nighttime spill.

- The Corps of Engineers should complete their timely application for a total dissolved gas waiver to the appropriate water quality agencies to allow for both spring and summer spill at the eight federal dams and five Mid-Columbia dams.

Dam Facility Operations and Research

- Fish facilities should be operated according to CRITFC and other salmon managers' recommendations for the Corps of Engineers' 2004 Fish Passage Plan.[5] Inspection of facilities should be increased to a minimum of three inspections per day.

- Fish facilities should have full components of spare parts and backup systems, consistent with CRITFC and other fishery agencies recommendations to the Corps' 2004 Fish Passage Plan.

- Monitoring systems for water quality should be installed by the federal operators throughout the dams and reservoirs with real-time tracking of data.

- Mainstem research that involves fish handing and tagging and modifications to fish protection measures should be extremely limited, should not compromise fishery operations and should meet consensus tribal and fishery agency approval.

Fish Facility Mitigation Projects

- A list of mitigation projects has been compiled for dam fish passage facilities (Attachment 4). Funding of these projects would individually and collectively increase juvenile and adult passage success and survival.

[5] Formal CRITFC comments on the 2004 Corps' passage plan are in progress and will be submitted by March 16. CRITFC recommendations on the Corps' 2003 passage plan are attached to the ROP as a placeholder.

2004 FCRPS Flow Operations

The 2004 River Operations Plan recommends that the federal operators reshape available runoff and reservoir storage to create a natural peaking (i.e., normative) flow regime. The Plan specifically dedicates available runoff and storage to shaping the limited amount of water to best meet the migration and habitat requirements for anadromous fish.

That salmon flow is positively related to increases in survival and productivity has been established in various forums worldwide including a 1994 independent scientific review under the Northwest Power Planning Council, biological opinions and recent analyses by the fishery agencies and tribes (Agencies and Tribes 2003). In their 1995-1998 FCRPS Biological Opinion, NMFS provided minimum flow recommendations for listed salmon and established seasonal, flat, "target flow" regimes, which were considered the minimum flows necessary to prevent jeopardy to listed salmon populations. The NMFS' 2000 FCRPS Biological Opinion continues the concept of "target flows" for salmon, where specific seasonal average flows are to be met at Lower Granite, Priest Rapids and McNary Dam. During the creation of the target flow concept, it was realized by NMFS and the federal operators that the seasonal targets would not be met during the lowest series of water years, such as the case in 2003 and 2001, and in many higher runoff years.

The 2000 Biological Opinion differs from the 1995-1998 Biological Opinion in that the federal operators have more discretion to avoid implementing measures that will insure that flow targets are met. For example, the 1995-1998 Biological Opinion required the Corps to shift flood control storage further down the system and modify flood control rule curves to allow reservoirs to store more of the spring runoff for fish summer flows. In the 1995-1998 Biological Opinion, the Bureau of Reclamation was to provide an additional 1 million acre-feet (MaF) of water from the upper Snake for salmon flows. Again, this operation has yet to be realized.

The Plan's hydrograph has monthly flow objectives that would have flows peak well below flood stages in Portland and other locations [6] (Figures 1 and 2). Alternative flood control curves were modeled with GENESYS (Martin 2004) and the proposed URC values are listed in Table 2. Water Years 1961, 1962, and 1967 are used in the modeling because their volumes average out to near CRITFC's projected 104 MaF forecast for WY 2004.

In the Plan, the receding limb of the hydrograph that provides summer fish flows would be augmented by adding drafts of upper basin storage beyond what is required in the NMFS 2000 Biological Opinion. Drafts include an additional 500 KaF from Non-Treaty Storage from BC Hydro projects, an additional 450 KaF of upper Snake storage from Brownlee, and 237 KaF of Hells Canyon Complex storage. The resultant summer flows would create better migration conditions by reducing both salmon travel time and mainstem river temperatures.

[6] Flood stage is defined by the Corps as 550 kcfs measured at The Dalles Dam. Bank-full stage is defined by the Corps as 450 kcfs measured at The Dalles. The peak flow in CRITFC's 2004 River Operations Plan with altered flood control rule curves is about 386 kcfs at The Dalles, or 64 kcfs below bank-full. In the 2002 Biological Assessment for the Lower Columbia Channel Deepening, the Corps states that flood control was managed to keep peak flows at The Dalles at 550 kcfs in 1970 and prior years. In recent years, the Corps has managed to keep peak flows at The Dalles at about 360 kcfs, without Congressional authorization.

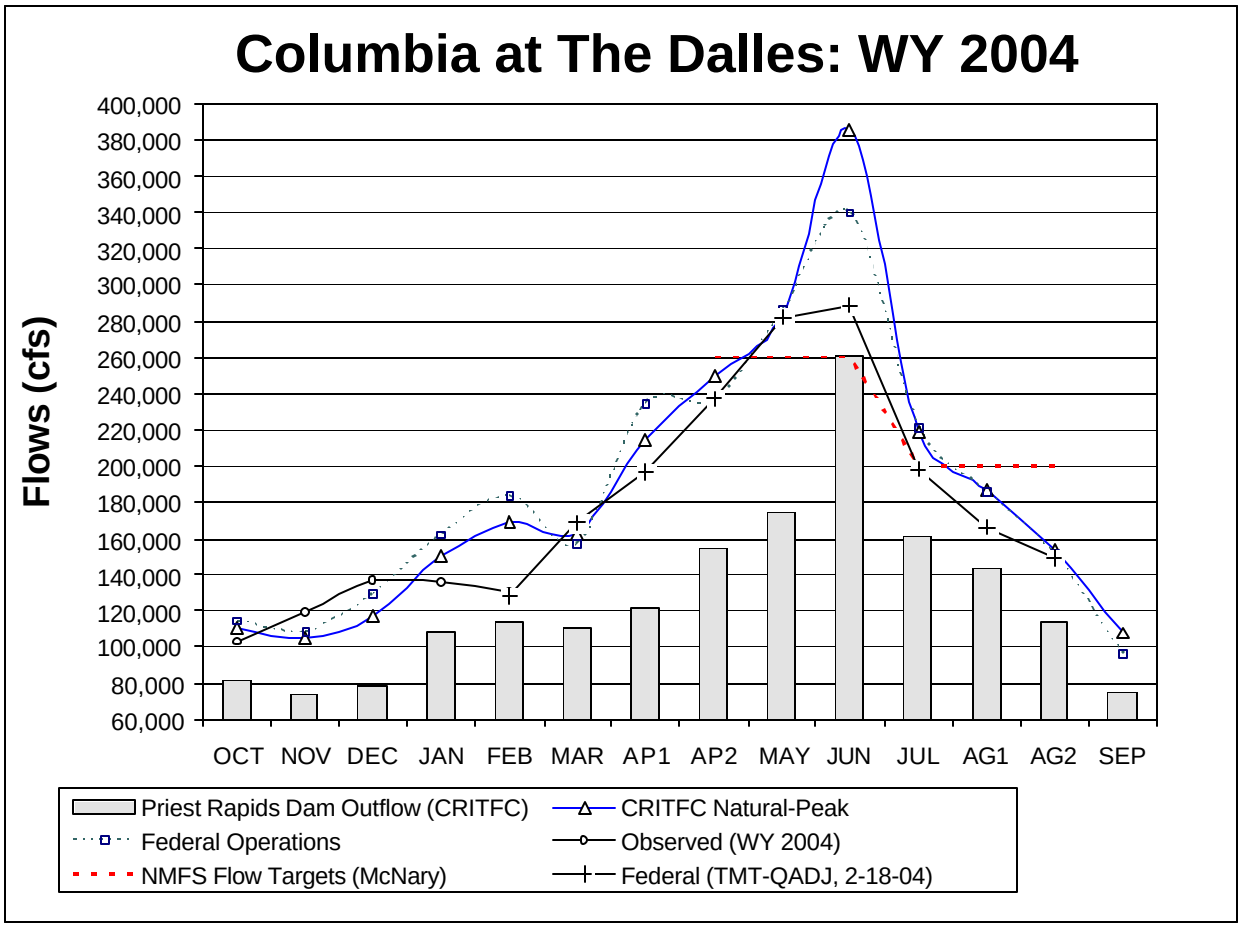

Figure 1. 2004 CRITFC River Operations Plan hydrograph for the Columbia at The Dalles and Columbia at Priest Rapids as compared to 2000 Biological Opinion flow targets, WY 2004 observed river flows, and likely WY 2004 river flows under federal operations (TMT-QADJ).

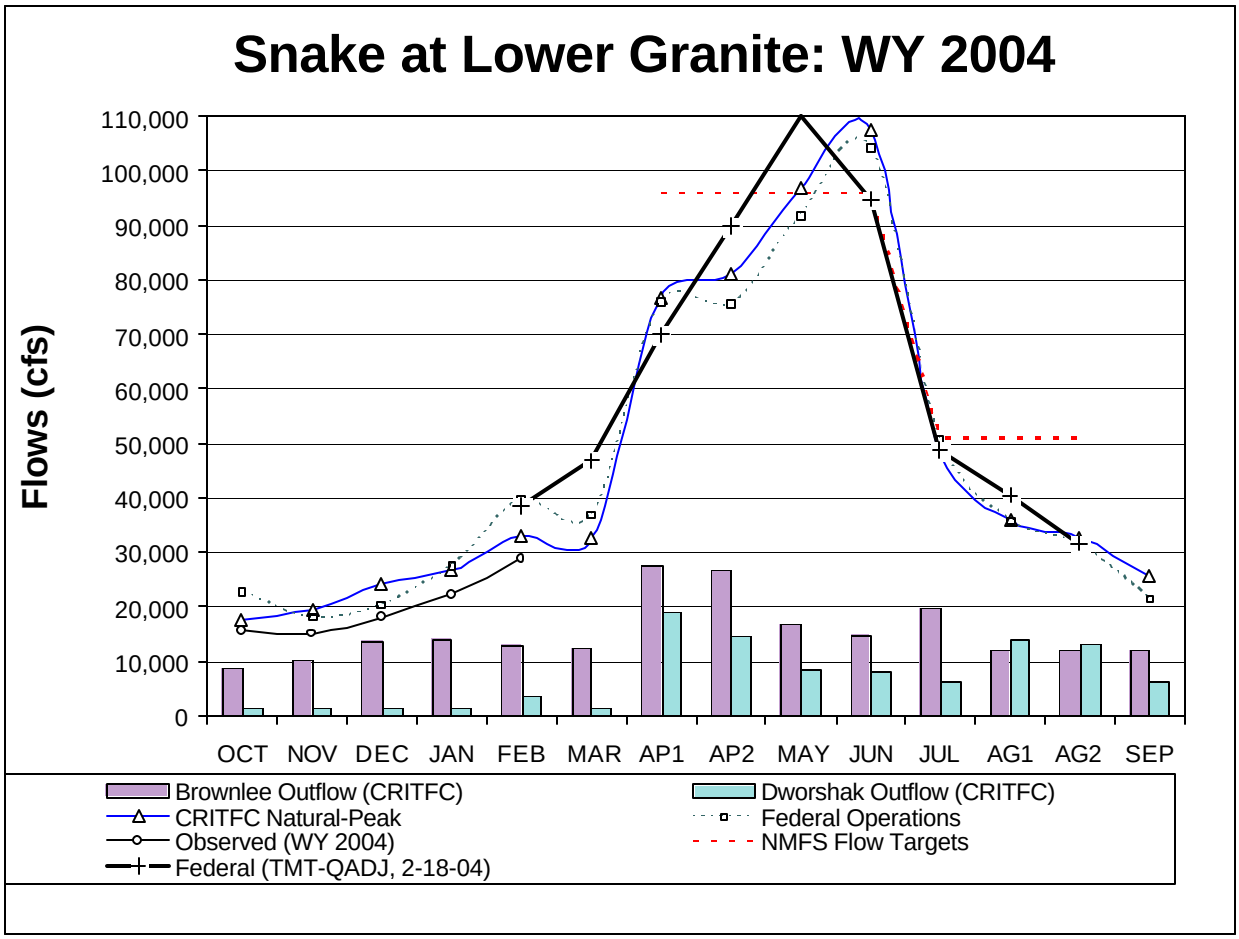

Figure 2. 2004 CRITFC River Operations Plan hydrograph for the Snake River at Lower Granite as compared to 2000 Biological Opinion flow targets, observed WY 2004 river flow, and likely 2004 river flows under federal operations (TMT-QADJ).

SYSTEM FLOOD CONTROL: UPPER RULE CURVE (URC), as modeled in GENESYS

WATER YEAR 2004 (average of WY 1961, 1962, and 1967)

GRAND TOTAL: KaF: **14863**

January 31st, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	10704.9	2457.3	10704.9	2457.3	0.0	
Arrow, BC	4885.8	1426.2	4687.4	1424.5	198.3	
Grand Coulee	5184.8	1290.0	5185.0	1290.0	-0.2	
Brownlee	975.2	2077.0	975.2	2077.0	0.0	
Dworshak	1286.4	1556.2	989.0	1535.2	297.4	**496**

February 28th, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	10120.8	2451.4	10120.8	2451.5	0.0	
Arrow, BC	3609.9	1415.1	3411.6	1413.3	198.3	
Grand Coulee	4988.9	1287.5	4988.9	1287.5	0.0	
Brownlee	898.8	2071.4	832.7	2066.7	66.1	
Dworshak	1175.9	1548.5	779.3	1519.5	396.6	**661**

March 31st, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	9472.9	2444.7	9472.9	2444.7	0.0	
Arrow, BC	3586.3	1414.9	1999.7	1400	1586.6	
Grand Coulee	5036.3	1288.1	3208.4	1263.6	1827.9	
Brownlee	975.2	2077.0	914.2	2072.5	61.0	
Dworshak	1629.2	1578.3	737.1	1516.2	892.1	**4368**

April 15th, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	9671.2	2446.7	9472.9	2444.7	198.3	
Arrow, BC	3322.4	1412.5	2132.4	1401.2	1190.0	
Grand Coulee	4648.8	1283.1	1930.4	1244.7	2718.5	
Brownlee	729.5	2058.0	580.8	2044.8	148.7	
Dworshak	1136.7	1545.8	513.9	1497.5	622.7	**4878**

April 30th, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	9671.2	2446.7	9472.9	2444.7	198.3	
Arrow, BC	2560.2	1405.4	2361.9	1403.4	198.3	
Grand Coulee	2995.7	1260.5	1210.7	1232.0	1784.9	
Brownlee	501.6	2037.3	501.6	2037.3	0.0	
Dworshak	1088.0	1542.4	592.9	1504.4	495.0	**2677**

May 31st, KaF:	***CRITFC***	(elev.)	Federal Plan	(elev.)	Difference (KaF)	Sum Total
Mica, BC	10268.2	2452.8	10069.8	2450.8	198.3	
Arrow, BC	4018.1	1418.8	3621.4	1415.2	396.7	
Grand Coulee	3247.4	1264.1	2255.8	1249.3	991.6	
Brownlee	664.8	2052.7	664.8	2052.7	0.0	
Dworshak	1681.1	1581.4	1483.6	1569.3	197.5	**1784**

Table 2. Flood control Upper Rule Curves, as modeled in the NPPC GENESYS Hydro model.

2004 Spill Program for the Columbia Basin

The 2004 River Operations Plan recommends a program to increase spill at key projects in order to significantly increase overall passage success and survival for the 2004 juvenile and adult migrants. CRITFC does not support any reduction in Biological Opinion spill; in fact the ROP extends the spill season and adds additional spill at mainstem dams.

Principal features of this spill program include:

- Provision for summer spill at Snake River and McNary dams. The current NMFS 2000 FCRPS Biological Opinion does not require summer spill, despite the lack of scientific evidence that indicates transporting summer migrants would be advantageous compared to spilling migrants over dams. [7] CRITFC has advocated for a summer spill program and transport study (with summer spill) in the Lower Snake River for at least the last five years. This controversy was expressed in the fall fishery negotiations in *U.S. v. Oregon* in the last several years. CRITFC will continue to oppose any Snake River or McNary transport study that does include a reasonable spill and flow component.

- Provision for daytime spill at John Day, McNary and Lower Snake River dams. When implemented, daytime spill has been demonstrated to be as successful, or more so, than nighttime spill at most dams. Early migrations of abundant 2004 fall chinook migrants from the Hanford Reach will achieve better protection from daytime spill at McNary and John Day than under no spill conditions.

- Extension of spill season. The Plan also recommends that the spill season be extended in duration over that offered in the NMFS 2000 FCRPS Biological Opinion. Because mainstem river temperatures have been much warmer than in past years, it is very likely that juvenile migrations will start earlier than in the past and kelts will be migrating and need downstream protection. Early spill will better protect spring chinook kelts emigrating seaward. Recent radio-telemetry studies indicate that about half of steelhead spawners return to sea and that spill increases kelt survival (English et al. 2001; English et al. 2003; Evans et al. 2001; Evans 2002).[8] Spill should begin at mainstem dams around March 20, depending on the status of the migrations. Depending on monitoring assessments, spill should be extended to September 15 at lower Columbia Dams to assist millions of late migrating juvenile salmon and to reduce powerhouse injuries to adult steelhead and fall chinook that fall back at dams. Recent analysis by the Fish Passage Center indicates that a significant number of ESA- listed fish, including Clearwater fall Chinook and unlisted fish migrate through the hydrosystem in September.

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[7] Recent analysis *Review of the Bonneville Power Administration's analysis of the biological impacts of alternative summer spill operations* (Bouwes 2004) indicates

[8] Telemetry data from these studies indicate that in 2001 with no spill and screen system turbine passage, only 3.8% of radio-tagged kelts survived from Lower Granite Dam to the Bonneville Dam tailrace. These studies indicate that that if spill and sluiceway passage is provided, 86-93% of kelts will use these routes, which insure substantially higher survival rates through the dams.

- Real- time spill ramping impacting fish passage goals. During the 2002 spill season, spill levels were ramped up and down depending on the TDG readings from monitoring sites below dams. Atmospheric conditions, combined with temperature greatly influence the accuracy of TDG monitoring sites. Depending on exceedences of TDG levels that would violate gas waivers from the state water quality agencies, spill levels were reduced to levels well below the TDG waiver levels, and this condition was left for several hours. Thus, spill volumes required in the NMFS 2000 FCRPS Biological Opinion were not provided. It appears to CRITFC that Corps' actions to hold spill at levels below the gas waivers for hours after reducing spill is negatively impacting regional passage goals. For example, total dissolved gas levels at Bonneville's tailwater location are quite variable and these levels can impact spill operations at Bonneville, The Dalles and, to a lesser degree, John Day. It is our understanding that the Corps has set up a protocol to deal with ramping down spill when the monitoring sites are above the standard, however, a protocol for the real-time expedited ramping up of spill when the monitoring sites are under the gas waiver and the spill level is lower than intended in the NMFS 2000 FCRPS Biological Opinion has not been completed. The Corps should install the capacity to resolve this issue at all Corps dams by implementing project operational measures in the 2003 Fish Passage Plan and ensure that all dam operators closely follow the measures.

Priorities:

Refer to Table 3 for the details of project spill operations. All proposed operations conform to existing total dissolved gas constraints.

Bonneville (BON). Spill is very effective and efficient at Bonneville. Past survival studies indicate that for juvenile migrants, spill resulted in a relative survival to the estuary of 98% compared to screen bypass and turbine passage survival of 80% and 82% respectively. Recent installation of spillway deflectors decreased total dissolved gas levels to allow increased spill levels. CRITFC recommends daytime spill to the 120 kcfs until an additional fallback and potential delay of adults can be evaluated to determine if daytime spill to the cap is warranted. Fallback information for 2000 and 2002 showed little difference between fallback within 24 hours of exiting the adult ladder under low (75 kcfs) and gas cap spill. The 2002 balloon tag work showed higher survival and lower mortality under the higher spill rates at Bonneville (Normadeu, 2002 the final draft is still under review). Nighttime spill would set at ~150 kcfs or Gas Cap. At least three days of spill should be allocated at these levels to protect release of the Spring Creek Hatchery fall chinook migration during mid-March.

McNary (MCN). McNary is the only Lower Columbia dam that is not scheduled to have voluntary spill 24 hours a day in either spring or summer. The Plan's recommended hydrograph will create some involuntary spill at McNary as the powerhouse is hydraulically limited for flows up to about 140 kcfs. However, there is discussion of eliminating the 1% turbine operating range at this project which would further reduce any amount of involuntary spill. McNary passes a substantial number of Columbia Basin salmon from the Mid-Columbia, Snake River and Hanford Reach. The existing screened bypass system has structural and hydraulic problems; PIT-

Tag studies indicate that juveniles that experience multiple screen bypass passage have lower smolt-to-adult returns than juveniles that pass thorough spill and turbines (Bouwes et al. 2002; Budy et al. 2002). Of about 200,000 juvenile spring chinook marked and released in 1995 from the bypass system, no adults returned. Transportation results to date have been equivocal. Thus, to spread-the-risk [9] and encourage better tailrace egress conditions to avoid predators and delay, the Plan recommends that the Corps provide daytime spill at a level commensurate with the current nighttime Biological Opinion spill operation. Further, the Plan recommends that the Corps consider removing half of the turbine intake screens especially during the summer months when river temperatures often exceed the water quality standard.

The Dalles (TDA). Due to concerns with juvenile turbine passage (survivals in the low 80% range; 2000 FCRPS Opinion, Appendix D), it is prudent to increase non-turbine passage routes, which include the sluiceway and spillway. Spill is the only passage route that can immediately increase juvenile passage survival. The 1995-1998 FCRPS biological opinion required spill at 64% of daily average flow. Based upon questionable survival studies, NMFS decreased spill to 40% of daily average flow. In 2002 project survival decreased significantly. This subjects more juveniles to turbine passage. The CRITFC Plan recommends an increase in spill from the 2000 FCRPS Opinion level from 40% to 50% of daily average flow. North loading of the spillway with these flows would avoid placing juvenile salmon toward shallow island predation zones where they were placed with the 64% spill. The 2003 research and fish passage at TDA is best served by maintaining a constant spill level during the migration season.

John Day (JDA). Critical uncertainties remain regarding spill operations at John Day. Research in 2001 (Beeman, Counnihan et al. USGS, 2001) indicated that radio-tagged juveniles using the screened bypass outfall had a direct survival of 88-92%, while juveniles passing through spill survived in the 98-100% range. CRITFC proposes the best operation would be 30% of daily average flow during the day with 45 – 50% daily average flow at night. Night spill is very effective at passing fish. However the large volume of spill required to generate the high fish passage efficiency may in part, create poor conditions at the screened bypass outfall, which in 2002, may have led to lower survival. (Beeman and Counnihan 2002) Furthermore project operations of the turbine units were shown to be different than that outlined in the COE Fish Passage Plan (FPP). Hydraulic studies indicated a marked improvement in tailrace conditions at the outfall when turbine priority was followed as outlined in the FPP. Because indirect mortality rates and lowered smolt-to-adult survival rates occur for smolts that pass through screened bypass systems and bypass systems select against juvenile lamprey and certain salmons stocks, we recommend maximizing spill at John Day and examining fish passage without turbine intake screens through comparative survival studies as a high priority. In the future, to increase passage we recommend investigations of removable spillway weirs or similar surface spill options at JDA to increase fish passage efficiency. Current estimates for turbine passage in 2002 were extremely low with large confident intervals. Therefore, it is be prudent to reduce the exposure of juveniles to the powerhouse and potential turbine passage.

[9] Under the CRITFC Plan, "Spread the risk" entails an operation where approximately half of the migrants are passed through the dam via surface bypass and/or spill and the other half are passed through turbine screened systems and transported in trucks or barges.

Lower Monumental (LMN). With the repairs to the stilling basin complete, CRITFC strongly recommends the implementation of 24-hour spill for spring migrants and summer migrants. Transportation at Lower Monumental for spring migrants has shown to return fewer adults than Lower Granite, indicating that some serious problem in the screened bypass system or transportation system may be selecting against migrants. Summer migrant transportation has not been examined yet, but results from summer migrant transportation at McNary are not encouraging. We recommend spread the risk for migrants at this project and comparative survival studies that require removal of turbine intake screens. Furthermore, NMFS has suggested an operational change in the spill program at Lower Monumental. The 2000 FCRPS Biological Opinion indicated a 24-hour spill to gas cap operation. The proposed federal 2004 spill operation is one based on spill rates of approximately 50% of the instantaneous flow in order to reduce tailrace eddies. Whether or not this change would be beneficial for salmon has not been reviewed and CRITFC recommends a carefully structured evaluation before the spill change takes place. Survival and passage data from other projects, such as Priest Rapids indicate that salmon migration timing and survival has not been reduced from large eddy conditions in tailraces.

Little Goose (LGS). Currently, under the 2000 FCRPS Biological Opinion, the Corps does not provide daytime or summer spill. CRITFC strongly recommends the implementation of 24-hour spill for spring migrants and summer migrants. Smolt-to-adult survivals for juveniles that pass through screened bypass systems indicate fewer adults lower rates that for juveniles that pass through non-screened bypass routes. Spring transportation at Little Goose has been equivocal (Bouwes et al. 2002), thus, CRITFC recommends a spread the risk approach for juvenile migrants with about half passed in spill and the other half transported. Summer migrant transportation has not been examined yet, but results from summer migrant transportation at McNary are not encouraging. We recommend spread the risk for summer migrants at this project and comparative survival studies that require removal of turbine intake screens.

Lower Granite (LWG). For 2004, the Corps has left the removable spillway weir (RSW) installed in an attempt to increase fish passage effectiveness. CRITFC believes that the weir, with some auxiliary spill, should be tested in 2004 against spill at levels that approach total dissolved gas cap limits to determine if there is a difference in project fish passage efficiency (FPE). Auxiliary spill should be set at 22 kcfs to insure that juveniles are provided the best possible tailrace egress conditions, and that they are attracted to the RSW zone of influence in the forebay. RSW/spill tests should only compare two conditions to insure that there are adequate test blocks to insure results have statistical precision and robustness. It is vital to test the performance of the RSW at Lower Granite for summer migrants.

Ice Harbor (IHR). For 2004, CRITFC recommends a comprehensive study to evaluate passage as a whole at Ice Harbor. Several survival studies have been done at IHR in recent years with a large variety in survival estimates for both spring and summer. (Eppard et al. 2002 and 2003) It appears that high spill volumes in low tail water and low flow conditions do not provide optimal passage for juveniles. Whether this problem is due to mechanical/hydraulic conditions at the spillway, poor egress from the tailrace, which increases predation, or some combination of these factors is unclear. CRITFC recommends conducting a study that compared a nighttime spill

level less than the 100-kcfs/TDG cap to the existing spill level. Further refinement and study of the current spill patterns should also be examined to insure the best egress conditions possible.

Rock Island. This project still is under the authority of the Rock Island Settlement Agreement and established spill conservation account, despite incomplete Habitat Conservation Plan development. Chelan PUD should coordinate project spill with fishery managers through the Mid-Columbia Coordinating Committee. Spill should begin and end at the direction of the Committee, and should be provided at a minimum rate of 31 kcfs consistent with the 2000 spill program.

Rocky Reach. This project is still under the authority of the Mid-Columbia FERC proceedings, despite incomplete Habitat Conservation Plan Development. Chelan PUD should coordinate project spill with fishery managers at the direction of the Mid-Columbia Coordinating Committee. Spill should begin and end at the direction of the Committee, and should be provided at a minimum rate of 20% of daily average flows.

Wanapum. Spill should be provided as specified by the 2000 Spill Memorandum of Agreement (MOA) between Grant PUD and the Joint Fishery Parties, as modified by mutually agreeable research. The Agreement specifies that Grant will spill 43% of daily average flow in the spring and 49% of daily average flow in the summer to pass 95% of the juvenile migrants and meet an 80% FPE and 95% survival standard estimate. The beginning and end of spring spill is determined by the Mid-Columbia Coordinating Committee and the beginning of summer spill is June 15 or when fish are present, whichever occurs first and ends between August 15 and August 30 based upon in-season monitoring.

Priest Rapids. Spill should be provided as specified by the 2000 Spill Memorandum of Agreement (MOA) between Grant PUD and the Joint Fishery Parties as modified by mutual agreement for research. The Agreement specifies that Grant will spill 61% of daily average flow in the spring and 39% of daily average flow in the summer to pass 95% of the juvenile migrants and meet an 80% FPE and 95% survival standard estimate. The beginning and end of spring spill is determined by the Mid-Columbia Coordinating Committee and the beginning of summer spill is June 15 or when fish are present, whichever occurs first and ends between August 15 and August 30 based upon in-season monitoring. Spill at Priest should be increased by an equal amount of spill foregone at Wanapum if total dissolved gas restrictions limit Wanapum spill from achieving MOA required percentages.

Table 3. 2004 River Operations Plan Spill Program

Project	Biological Opinion Spill Spring	CRITFC Plan Spring	Biological Opinion Summer Spill	CRITFC Plan Summer
BON				
Day	75 kcfs	120 kcfs	75 kcfs	120 kcfs
Night	120-150 kcfs (Cap)	120-150 kcfs (Cap)	120-150 kcfs (Cap)	120-150 kcfs (Cap)
TDA				
Day	40% of flow	50% of flow	40% of flow	50% of flow
Night	40% of flow	50% of flow	40% of flow	50% of flow
JDA				
Day	0	30%	0	30%
Night	60% flow or max 180	45% vs. 60% (BiOp)	60% of flow	60% vs. 30%
MCN				
Day	0	50%	0	50%
Night	Gas Cap	Gas Cap	0	50%
IHR				
Day	45 kcfs	45 kcfs	0	45 kcfs
Night	100 kcfs	~50% flow vs. 100 kcfs	0	~50% flow vs. 100 kcfs
LMN				
Day	~50% of flow variable	40 kcfs (Gas Cap) vs. ~50% flow	0	30 kcfs vs ~50% flow
Night	~50% of flow variable	40 kcfs (Gas Cap) vs. ~50% flow	0	40 kcfs (Gas Cap)
LGS				
Day	0	45 kcfs (Gas Cap)	0	30 kcfs vs. ~50% flow
Night	45 kcfs (Gas Cap)	45 kcfs (Gas Cap)	0	45 kcfs (Gas Cap)
LWG				
Day	0	22 kcfs vs. 60 kcfs	0	22 kcfs vs. 60 kcfs
Night	60 kcfs (Gas Cap)	22 kcfs vs. 60 kcfs	0	22 kcfs vs. 60 kcfs

Attachments 1- 5

References

Beeman, J., and T. Counihan . 2001. Survival estimates of migrant juvenile salmonids in the Columbia River from John Day Dam Through Bonneville using Radio-Telemetry, 2001. USGS Western Fisheries Research Center, Columbia River Research Laboratory. Cook WA.

Beeman, J. and T.Counihan et al. 2001. Summary of Juvenile Salmonid FPE, Survival and tailrace egress based on radio telemetry at John Day Dam in Spring 2002. AFEP Presentation. USGS Western Fisheries Research Center, Columbia River Research Laboratory. Cook WA.

Bouwes, N., C. Petrosky, H.Schaller, P.Wilson, E.Weber, S.Scott and R.Boyce. 2002. Comparative survival study (CSS) of PIT Tagged Spring/Summer Chinook. Status Report for Migration Years 1997-2000. Mark/Recapture Activities. Contract #8712702 to Bonneville Power Administration. By Columbia Basin Fishery Agencies and Tribes. Fish Passage Center. Portland, Oregon.

Budy, P., G.P. Thiede, N. Bouwes, C.E. Petrosky and H. Schaller. 2002. Evidence linking delayed mortality of Snake River salmon to their earlier hydrosystem experience. North American Journal of Fisheries Management. 22:35-51.

Bunn, S.E. and A.H. Arthington. 2002. Basic Principles and Ecological Consequences of Altered Flow Regimes for Aquatic Biodiversity. Environmental Management, v. 30 (4), pp. 492-507.

English, K.K., C. Sliwinski, B. Nass, and J.R. Stevenson. 2003. Assessment of adult steelhead migration through the Mid-Columbia River using radio-telemetry techiniques, 2001-2002. Draft report to Mid-Columbia Public Utility Districts. By LGL Limited. Sidney, B.C.

Eppard, B. 2002. Ice Harbor Dam Spillway Survival Migrational Characteristics of Juvenile Chinook Salmon Trough McNary Dam (AFEP Presentation). Fish Ecology Division Northwest Fisheries Science Center National Marine Fisheries Service. Seattle WA.

Evans, A. 2002. Steelhead (*Oncorhynchus mykiss*) kelt outmigration from Lower Granite Dam to Bonneville Dam: abundance, downstream conversion rates, routes of passage and travel times. Contract No. DACW68-01-0016 to Corps of Engineers. By Columbia River Inter-Tribal Fish Commission. Portland, Oregon.

Evans, A., and R. Beaty. 2001. Identification and enumeration of Steelhead (*Oncorhynchus mykiss*) kelts in the juvenile collection systems of Lower Granite and Little Goose dams, 2000. Contract No. DACW68-00R--0016 to Corps of Engineers. By Columbia River Inter-Tribal Fish Commission. Portland, Oregon.

Fishery Managers (Columbia River Inter-Tribal Fish Commission, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife). 1994. Scientific Rationale for Implementing a Spring and Summer spill program to increase juvenile salmonid survival in the Snake and Columbia Rivers. CRITFC. Portland, Oregon.

Hamlet, A. F. and D. P. Lettenmaier. 2003. One-year Lead Time Experimental Streamflow Forecasts for the Columbia River at The Dalles. Climate Impacts Group, University of Washington, Seattle, Washington. (http://www.ce.washington.edu/~hamleaf/DallesForecast.html)

Hoffarth, P. District Fisheries Biologist. Washington Department of Fish and Wildlife. Kennewick, WA. February 20, 2003. Personal communication.

Hyatt, K. Fishery Scientist, Department of Fisheries and Oceans, Canada. February 13, 2003. Personal communication.

Martin, K. 2002. Water Supply Forecast Correction Curves. Presentation to the Oregon Chapter of the American Meteorological Society. Portland, Oregon. (http://www.critfc.org/tech/03-forecast_report.html)

Martin, K. 2004. Altered Flood Control, Climate Change, and Rebuilding Pacific Northwest Salmon Stocks. Presented at CRITFC's Regional Flood Control Workshop. Columbia River Inter-Tribal Fish Commission, Portland, Oregon. (http://www.critfc.org/text/nat_riv.html)

NPPC (Northwest Power and Planning Council). 1999. Report and recommendations of the Northwest Power Planning Council upon Review of the Corps of Engineers' Columbia River Fish Mitigation Program. Report 99-5. Portland, Oregon.

Williams, R. and 11 co-authors. 1996. *Return to the River*. Restoration of Salmonid Fish in the Columbia River ecosystem. Northwest Power Planning Council. Portland, Oregon. (http://www.nwcouncil.org/library/return/2000-12.htm)

Williams, R. and nine co-authors. 1998. Recommendations for stable flows in the Hanford Reach during the time when juvenile fall chinook are present each spring. August 3, 1998 Memorandum from the Independent Scientific Advisory Board to J. Etchart, Chair. Northwest Power Planning Council. Portland, Oregon.

Attachment 2

2004 Hanford Protection Operations to Reduce Juvenile Hanford Reach Fall Chinook Stranding and Mortality

Power peaking causing flow fluctuations from federal and FERC licensed dams in the mid-Columbia River can be extreme (Figure 3), with shoreline water levels varying up to 13 feet over a 24 hour period. When this occurs during the early emergence and migration of Hanford fall chinook from redds, hundreds of thousands of fry are stranded in pools or other entrapments left by the receding river. Fry are susceptible to avian or fish predation, thermal shock, stress and desiccation. Most of the significant stranding occurs with shoreline fluctuations of 1-3 feet Wagner et al. 2000). Fluctuations at flows of 120 kcfs and under are especially problematic because they dewater significant shoreline areas and cause greater risks of stranding (Table 4). Due to 2003 drought conditions, flows are likely to be in this range. Thus, CRITFC recommends no more that plus or minus 10 kcfs changes in mainstem flows in the Reach over a 24 hour period measured from noon to noon the prior day.

Biological and hydrological monitoring of the stranding has occurred since 1998 with funding provided by BPA and Grant PUD. The tribes and fishery agencies initially recommended that ever increasing or stable flows be provided in the Reach, consistent with the recommendations of the NPPC's Independent Scientific Advisory Board (Williams et al. 1998). In the CRITFC tribes' *Spirit of the Salmon* restoration plan, fluctuation of no more than 10 % of the previous day's average flow in the Reach was recommended. However, the federal and mid-Columbia FERC power operators claimed that this operation could not be accomplished because of power needs. Instead they offered regimes that targeted flow fluctuations to plus or minus 20-40 kcfs over the previous 24-hour flows. Tribes and fishery agencies were left with no recourse and could but monitor the dead and stranded salmon over the next three years.

In 1999-2001, the federal and mid-Columbia FERC power operators implemented an operational regime aimed at limiting flow fluctuations to reduce stranding. In 1999, the operators attempted to keep flow fluctuations within a plus or minus 20 kcfs range. In other words, the river flow levels from Priest Rapids dam could fluctuation up to 40 kcfs in a 24-hour period. The estimated fry "at risk" of mortality [10] from these levels for 17 miles of the Reach (about one third of the Reach) in 1999 was about 382,000 and about 255,000 in 2000. The confidence intervals around these estimates were wide because more sampling effort is needed. The overall annual fry production for the Reach has been estimated by WDFW as 16-27 million salmon.[11] The operators believed that these losses were acceptable as a cost of doing business for regional power production. To date, no mitigation or compensation for these losses has been offered by the operators.

[10] "At risk" are fry that have been stranded and are not likely to get passage back to the river in time to avoid predation, thermal shock or other mortality.

[11] The reader should note the difficulties and uncertainties in deriving these estimates in footnote four and text below.

In 2001, the operators wanted greater power peaking flexibility, thus, they proposed a flow fluctuation of 40-80 kcfs in a 24-hour period. Given the extreme low flow conditions, with the second worst runoff conditions in the 70-year record, CRITFC objected to this flow band and proposed no more than a 10 kcfs fluctuation in a 24 hour period. The fishery agencies and operators agreed to proceed with up to a 40-80 kcfs band. The result was more than a four-fold increase for "at risk" fry or an estimate of about 1.6 million fry.

Based upon 1) review of the four years susceptibility data, 2) additional information supplied by the USFWS on dewatered areas below Priest Rapids Dam and, 3) taking into account likely 2003 Hanford Reach flow regimes from 50-200 kcfs, we recommend the specific operations provided below. These are offered to reduce stranding impacts on Hanford Bright fall chinook, ESA-listed steelhead and Pacific Lamprey. In order to achieve the recommended flow bands, the federal operators should limit power peaking from Grand Coulee and release additional water on weekends to assure the FERC-licensed operators can keep the flows within the CRITFC recommended 10-20 kcfs maximum flow fluctuations. During the period of high fry stranding susceptibility, if necessary, the federal operators should rely on other generation sources than Grand Coulee to meet power contract obligations to reduce flow fluctuations. In turn, the Mid-Columbia FERC operators, in particular Grant PUD, will have to fill reservoirs on Fridays to assure that appropriate Reach flows would be maintained over weekends when reduced power demand and/or flood control operations limit upriver flows from federal dams.

Monitoring of stranding impacts and overall loss estimates for the middle section of the reach will be implemented by Grant PUD and WDFW using similar methods and effort as in 2002. For 2004, CRITFC, WDFW, and the Yakama Nation will expand sampling efforts to the entire Reach based upon a stratified sampling design that focuses on entrapments. The USGS plans on studying behavioral aspects of stranding in conjunction with these efforts.

The following are CRITFC's recommendations for 2004 operational constraints for flow releases below Priest Rapids Dam to reduce mortality of emerging and rearing juvenile fall chinook in the Hanford Reach. In 2002, a large escapement of adult chinook will create an estimated 39 million fry into the Reach. Due to much warmer temperatures that normal these fry have already begun to emerge from the redds. It is critical that the following criteria be implemented by the federal and Mid-Columbia PUD operators to protect this significant productivity.

2004 Hanford Juvenile Fall Chinook Flow Recommendations

Starting Program Operating Constraints

Seining of the six established index sites will be conducted three days per week (Monday, Wednesday, and Friday) beginning one week prior to the estimated start of emergence. Once a daily total of 50 sub-yearling fall chinook salmon fry are captured, a daily flow fluctuation constraint of 40 kcfs would be imposed. This constraint will continue until a daily total of 100 fry are captured from the index sites at which time the following proposed flow constraints will be implemented. After the 100 chinook criteria have been met, index sampling would be decreased to once weekly (Wednesday).

When PRD daily discharge is between 36 and 80 kcfs.

When average daily discharge at Priest Rapids is between 36 and 80 kcfs, the mid-Columbia projects will limit flow fluctuations to no more than 10 kcfs in a 24-hour period.

- Flow bands between 36 and 80 kcfs dewater the most area with the least amount of fluctuation and have the most potential for catastrophic fish kills.
- River configuration - long shelves, and shallow water entrapments, substrates that heat up or drain quickly.

When PRD daily discharge is between 80 and 110 kcfs.

When average daily discharge at Priest Rapids is between 80 and 110 kcfs, the mid-Columbia projects [12] will limit flow fluctuations to no more than 10 kcfs in a 24-hour period.

- Flow bands between 80 and 110 kcfs hold optimal rearing habitat. Data suggests these areas hold large entrapments and some stranding sites including backwater sloughs with good rearing habitat.
- These flow bands are located at the upper most reaches of the lower river shelves. Evaluation years 1999 and 2000, showed the highest susceptibility areas between 80 and 120 kcfs.

When PRD daily discharge is between 110 and 140 kcfs.

When daily average discharge is between 110 and 140 kcfs, the mid-Columbia projects[1] will limit fluctuations to no more than 20 kcfs in a 24-hour period.

- Data suggests that flow bands between 120 and 190 kcfs offer reduced susceptibility but not in the reach directly below Priest Rapids Dam.

[12] The mid-Columbia projects refer to Grand Coulee, Chief Joseph, Wells, Rocky Reach, Rock Island, Wanapum and Priest Rapids that are operated under mid-Columbia hourly coordination agreements.

- River configuration - steep banks, area of exposed shoreline drop significantly between 110 and 140 kcfs.

When PRD daily discharge is between 140-170 kcfs

When daily average discharge is between 140 and 170 kcfs, the mid-Columbia projects[1] will limit fluctuations to no more than 20 kcfs in a 24 hour period.

- Data suggests that flow bands between 120 and 190 kcfs offer reduced susceptibility in the SHOALS reach, but not in the reach just below Priest Rapids Dam.

When PRD daily discharge is 170 kcfs and above

When daily average discharge is 170 and above, the mid-Columbia projects[1] will limit fluctuations to no more than 20 kcfs in a 24-hour period. A minimum hourly flow of 150 kcfs will be maintained.

- Constraints will protect the backwater areas of the sloughs (Hanford Slough and White Bluffs Slough) from dewatering.

Ending Program Operating Constraints

CRITFC and WDFW recommend that flow constraints be terminated after the accumulation of 1400 temperature units (TU) past calculated end of spawning under the Vernita Bar Settlement Agreement.

- Evaluations from 1999, 2000, and 2001 show that susceptibility drops significantly after 1200 TU's and after 1400 TU it is assumed that susceptibility has reduced to allow for termination of constraints. The last fish found stranded and entrapped in 1999 and 2000 fell relatively close to 1400 TU's. The 2001 evaluation showed fish becoming entrapped and stranded past this deadline but at decreased rates.

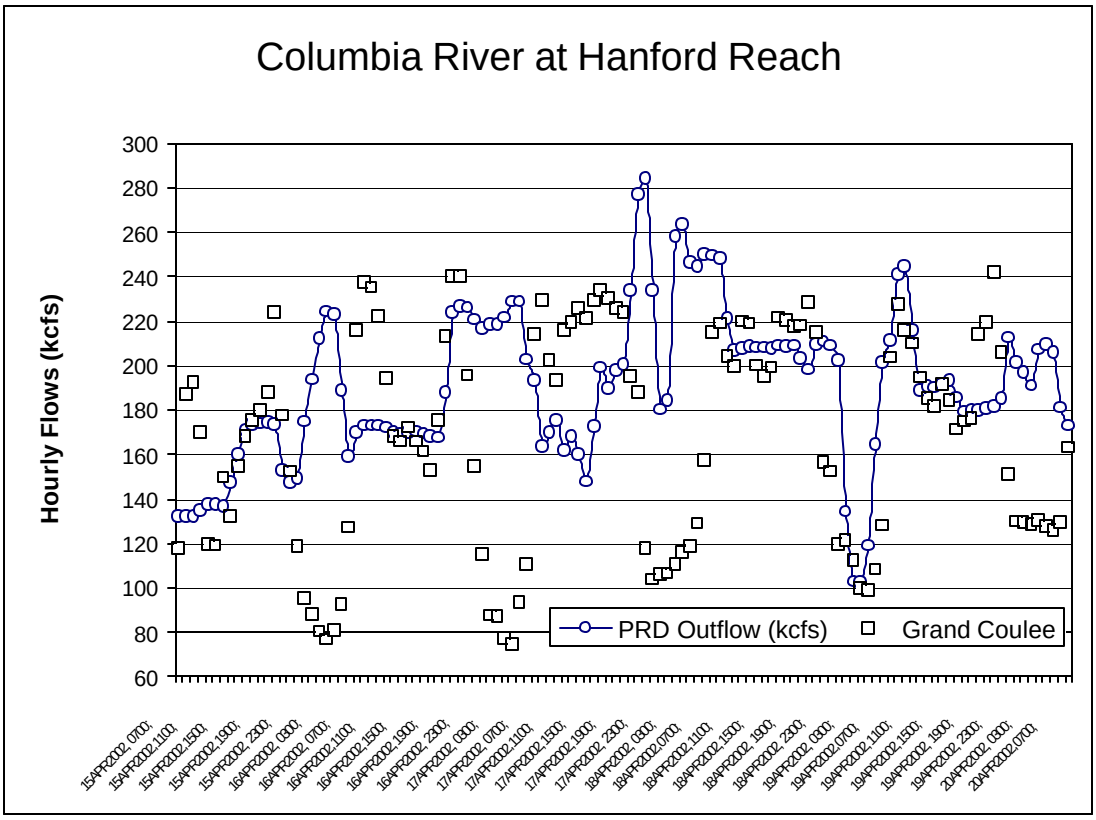

Figure 3. Hourly flows in the Hanford Reach during the 2002 out-migration.

Table 4. Flow bands and number of stranded and entrapped juvenile fall chinook salmon found on the Hanford Reach of the Columbia River in 2002 (From WDFW 2003).

Flow Band (kcfs)	Total Shoreline Within Study Area (hectares)	Number of Flow Fluctuations During Season	Shoreline Exposed During Season (hectares)	Number of Plots Sampled	Area Sampled (hectares)	Number of Plots with Chinook	Number of Chinook Found at Risk	Number of Chinook Found at Risk per Hectare
50-80	1,234.64	2.98	3,683.97	28	7.03	12	98	13.93
80-120	1,203.43	4.90	5,895.14	36	8.84	6	65	7.36
120-160	701.12	18.54	12,997.51	51	15.42	7	15	0.97
160-200	767.48	20.00	15,347.91	44	10.16	3	8	0.79
200-240	691.96	9.82	6,797.96	27	7.21	0	0	0.00
240-280	569.80	8.83	5,031.03	8	2.18	1	2	0.92
Total	5,168.43	65.07	336,320.91	194	50.84	29	188	3.70

Attachment 3

BPA-Idaho Power Company Water and Power Exchange

From the late 1980's until April 2001, BPA and Idaho Power Company (IPC) were engaged in annual exchange contracts for water and power. Typically, IPC would store water in the Hells Canyon Complex (Complex) in early spring and BPA would provide a power exchange to IPC. This storage would be released later in spring for salmon. The power generated from this release was sent back to BPA.

In the late summer, IPC would release storage and generate power, which would be sent to BPA. BPA would replace this power in September, which allowed IPC to store water to meet project elevations and assure that enough water was on hand for Hells Canyon fall chinook spawning.

In 1995, after release of the 1995-1998 FCRPS Biological Opinion, firm water exchange volumes and timing were established in contracts to meet Opinion RPAs. A five-year contract was finalized for power and water exchanges in 1996. In early May, IPC would release 110 KaF, and send power to BPA. BPA would send the power back to IPC the latter half of May and refill the Complex. In summer, IPC would 1) release 237 KaF from the Complex and 2) shape and pass 427 KaF of Bureau of Reclamation water through the Complex. The power generated from these releases was sent to Bonneville. Bonneville would send exchange power for the 237 KaF to IPC in September and send exchange power for the 427 KaF back to IPC the following winter.

Because power markets are more lucrative in summer months, BPA claimed that IPC gained a substantial financial advantage in the contract arrangement. BPA negotiated with NMFS to have the power exchange contract omitted from the 2000 Biological Opinion and the five-year contract expired on April 1, 2001. During 2001 and 2002 negotiations with the federal operators, the CRITFC tribes, Oregon and Idaho all pressed BPA to renew the exchange contracts with IPC. BPA claimed that they were at a financial disadvantage, thus, were unwilling to renew the contract, despite long negotiations with IPC that involved the Idaho Governor's office.

Without the contract in place, it appears difficult but not impossible for IPC to: 1) assure that the 427 KaF or additional upper Snake water will be shaped and passed through the Complex, 2) assure that the 110 KaF and 237 KaF will be provided in a timely manner for fish. This would assure that salmon obtain the water critical to their migrations, habitat and survival.

IPC recently released a draft license application for relicensing of the Complex, and is still engaged in ESA consultation for the Complex. In CRITFC comments on the draft license application, CRITFC analyses utilizing the GENESYS hydrologic model[13] indicate that, in

[13] The GENESYS model was developed by the Northwest Power Planning Council as a basinwide hydrologic model. It incorporates water routing thorough the Federal Columbia River Power System using a data set of 50 years of historical runoff (WY 1929-1978).

nearly all water years on record, a discrete 450 KaF [14] could be delivered downstream from Brownlee storage primarily in July for anadromous fish to meet the Opinion's Lower Granite target flows and the recommendations in the tribal recovery plan, *Wy-Kan-Ush-Mi Wa-Kish-Wit* (Nez Perce et al. 1995). These analyses show that in nearly all years, inflows into the Complex leave enough water to provide a minimum of 9.5 kcfs for fall chinook spawning flows in late September through early November, with spawning flows up to 13 kcfs possible in higher flow years. In addition, delivery of Complex water in July to the lower Snake would allow more judicious use of Dworshak Reservoir storage for temperature control. Idaho Power should conduct analyses that examine the potential for supplying 450 KaF, primarily in July, for flow augmentation in all water years while assuring that at least 9.5 kcfs is available for fall chinook spawning and rearing flows below the Complex.

Renewal of the BPA-IPC water exchange contract is important to facilitate vital flows downstream of the Complex for listed Snake River chinook and steelhead and endangered Snake River sockeye. Nonetheless, IPC has an obligation as a competent licensee to provide equitable treatment for salmon by providing the above storage volumes for flow augmentation.

[14] The 450 KaF should be contributed directly from Brownlee Reservoir. Bureau of Reclamation water from the upper Snake could be passed through in addition to the 450 KaF from Brownlee.

Attachment 4

2004 Fish Facility Mitigation Projects

1) Bonneville Dam. Automated Chain gates at Bonneville Powerhouse I sluiceway. This would allow for improved operation and better compliance with sluiceway criteria. The sluiceway has been shown to be a passage route for both juveniles and kelts; insuring that the sluiceway stays in criteria assures better access and utilization of this passage route.

2) Bonneville Powerhouse Two. Adult fishway trash rake system. Currently the rack and the rakes are not properly meshed, thus trash raking does not work well. The fishway units have to shut down to allow debris to float off. This problem has been ongoing for several years. In the past, during the adult passage season, debris build-up in the diffusers led to a failure of the system, and the ladder was forced to operate with only the emergency auxiliary water-supply system for nearly a month and fishway criteria was not met. Purchase of a proper rake system that meshes well with the rack will help to reduce the debris problem and should halt the operation of having to turn off the fish units at night to remove the debris. This on/off operation can lead to premature failure of the units and can possibly affect night passage of adults.

3) John Day Dam- North shore fishway pump The fishway pump is currently unable to provide entrance criteria for both north shore adult entrances due to a potential constriction in the hydraulic conduit. Funds could be used to determine a remedy for this situation.

4) John Day Dam- Full Flow PIT-Tag detection on the juvenile transport flume. Currently, adults that fallback over the dam can spend extended periods of time in the juvenile system since there is no way to move them from the channel. Several hundred adults are removed each time the system is dewatered. This dewatering is stressful to adults and has led to mortality. A full flow PIT-Tag detection system would allow for operation of the juvenile facility so that adults would not hold in the dewatering section of the transport flume. Further, juvenile stress would be reduced since the dewatering structure would not need to be operated.

5) McNary Dam juvenile screen system outfall. Concern has been raised about increased avian predation in conjunction with the outfall. Methods for reducing predation should be designed, implemented and evaluated for effectiveness.

6) Bonneville Dam. Bradford Island adult ladder repair and modernization. Currently the Bradford Island ladder is the oldest in the Columbia River Basin and renovation and repairs are underway. Increased funding would assure that the work would be expedited. This ladder system passes a significant portion of the entire Basin's returning adults, thus, expedient repairs are critical.

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Jim Ruff
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SUBJECT: **Comments on Draft 2004 FCRPS Water Management Plan for the Federal Columbia River Power System**

Dear Ms. Henriksen and Mr. Ruff:

On behalf of its member tribes, the Columbia River Inter-Tribal Fish Commission (CRITFC) appreciates the opportunity to comment on the draft 2004 Water Management Plan (DWMP) for the federal hydro system. We believe that significant information that is necessary to develop the plan has yet to be available or materialize. Thus, it is premature at this time to be considering many DWMP foundation issues. In the future, we recommend that the region expend precious fish recovery resources only once in developing the plan, when critical information is available in mid-January. This information includes but is not limited to:

- The first official water supply forecast is not released until January 1, 2004. Water supply is integral to the draft plan.
- Research results for many hydrosystem and fishery studies that will highly influence draft plan measures are not currently available.
- Other issues such as new transmission capability are still under development.

We have the following additional general comments on the DWMP.

First, the conduct of the Technical Management Team does not allow the free exchange of information between the fishery managers and the federal operators of the FCRPS. This is

because power marketing representatives are allow to observe and "listen in" on discussions regarding river operations that influence power marketing and sales, which may place federal operators to an economic disadvantage. This leads the federal operators to restrict fishery manager access to important river operation information, such as forecasted daily reservoir outflows and reservoir elevations to the fishery managers. Thus, CRITFC and other fishery managers cannot access critical information to plan operations to best benefit fish populations before and during the fish migration season.[15] To address this problem, we recommend that the federal operators convene a routine preseason and during season forum that excludes the marketing representatives, but allows the free exchange of hydrological and other information to the tribes and other fisheries managers. We suggest that the final water management plan (WMP) include a reference to this forum.

Second, we strongly recommend that the Corps' Annual Fish Passage Plan be appended to the final WMP. The FPP has specifics on spill operations, transportation, research and fish facility operations that are intricately tied to the WMP. Both of these documents are called for by the 2000 Biological Opinion; it does not make sense that they are kept in separate forums and never formally integrated.

Third, although the CRITFC tribes officially withdrew from the NMFS' Adaptive Management Forum in 1997,[16] the federal operators and federal fishery agencies still have a trust responsibility to formally consult with the CRITFC tribes before implementing actions, such as the water management plan, that will impact their trust and treaty resources. CRITFC can assist the federal agencies in arranging these consultations. The final WMP should contain a specific section indicating how the federal agencies intend to coordinate and consult with the tribes regarding all actions that will affect their treaty trust resources as required by the 1998 Secretarial Order for the Departments of Commerce and Interior, BPA's obligations to tribes, and the Corps' Nationwide Policy for Native American Tribes.

Fourth, the final WMP should include reference to and the details of the Detailed Operating Plan and annual PNCA planning hydro-regulations and non-power fishery constraints data submittals as the overarching plan to operate the FCRPS. The Corps and Reclamation's respective data submittals create the foundation for real-time decision making for river operations. Thus, while real-time river operations may be "tweaked" by the TMT, the actual plan to operate the river has already been established the February before the water year begins by the PNCA parties.

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[15] This information includes forecasted elevation at storage reservoirs and outflow information. Without this information, fishery managers cannot make well-informed decisions about flow management for fishery needs.

[16] In a letter dated May 16, 1997 from Ted Strong, CRITFC Executive Director to Will Stelle, NMFS Regional Director, CRITFC informed the federal government that it would, "… no longer participate in the NMFS adaptive management process, except as necessary to obtain information on system operations and configuration that cannot otherwise be obtained." In reaching this conclusion, CRITFC stated, "It is absolutely inappropriate for the policies of the United States, with respect to fulfillment of our treaties, to be determined by technical committees of biologists and engineers." CRITFC recommended that, "NMFS and the other federal agencies work with the Commission's member tribes to establish meaningful government-to-government relationship between the federal agencies and the tribes." And, "Consultations must be structured to reach agreement between NMFS and the tribes on policy issues before technical issues are referred to technical committees".

Fifth, there is not enough emphasis on water quality in the plan. Other than a section on dissolved gas, the plan is essentially silent on water quality actions to establish preferred temperatures and turbidity for the survival and productivity of anadromous fish. For example, water temperatures at the McNary juvenile bypass facility violate standards for an extended period of time every summer. There is no mention of point source pollution from the FCRPS (i.e., leaks from turbine and other equipment on dams).

Sixth, there is no mention of load following or power peaking operations in the plan. Such operations can cause desiccation of salmon redds, stranding of juvenile anadromous and resident fish and cause delay of juvenile and adult salmon. The final plan should acknowledge the impacts of power peaking on fish and offer management actions to reduce these impacts, such as limited peaking to some small percentage of the predicted base flow for the month. Such actions as experimental measures were offered by the ISAB in Report 2003-1, *Review of flow augmentation: Update and Clarification.*

Specific Comments

Section 1.1: Preparation of Plans

The DWMP does not refer to the tribes' *Spirit of the Salmon* (Nez Perce et al. 1995) anadromous fish restoration plan that has specific measures for river operations for all anadromous fish. As in the 2000 FCRPS Biological Opinion, the federal agencies should include reference to the tribes' plan, consistent with the federal agencies' obligations to consult and provide trust responsibility to the tribes.

Section 1.2: Strategy

This section lacks any reference to a basin-wide, ecosystem approach to increase productivity of listed and unlisted anadromous and resident fish (see Williams et al. 1996). Simply measuring reach survival of migrating juvenile fish as a performance standard is not adequate to restore productivity. For example, delayed mortality from hydrosystem passage does not occur until after the fish leave the last dam and enter saltwater (Budy et al. 2002). Further, there is no mention of increasing adult survival through the hydrosystem and increasing spawning success, two metrics essential to increasing anadromous fish productivity (Lichatowich and Cramer 1979). This section should be expanded beyond mere reach survival-performance standards.

Section 1.2.1.Hydro Strategies and Substrategies

Actions to meet water quality standards are needed for this section. Among other things, actions should include selected water releases from Dworshak Reservoir, investigation of selected water releases from Lake Roosevelt, keeping fish out of dam bypass and transportation systems under elevated temperature conditions that exceed standards, avoiding trapping adult fish under elevated temperature conditions that exceed standards, and monitoring of disease at dams under elevated temperature conditions. A high CRITFC priority is establishment of a

peaking (i.e., normative) hydrograph that provides for the environmental and passage conditions that support anadromous fish productivity to recovery goals (Williams et al. 1996). This is not mentioned in the DWMP.

Section 1.3: Non-Biological Opinion Actions

Tribal fishing should be listed for the John Day and The Dalles pools—not just Bonneville, and provision for a summer fishing season in July should be included. We recommend that the final WMP be restricted to fish and wildlife related actions, flood control and navigation actions. Recreational actions are lower priority and should not conflict with the other actions.

Section 2.1: Hydro-System Priorities

The action agencies must consult with NMFS and USFWS and the tribes before establishing priorities in the plan. We recommend that:

- The April 10 refill operation of reservoirs to their upper rule curve should be priority one.
- Refill of reservoirs to the June 30 should be priority two.
- Operation of storage reservoirs to meet criteria for bull trout and sturgeon as priority three.

Meeting these priorities should take precedence over meeting power generation needs. If flood control is operated with flexibility and a reasonable minimum spawning flow for chum is established and maintained through reduction of lower river power peaking, it is not necessary to consider reducing Hanford Reach flows established to protect thousands of fall chinook redds. The 2000 FCRPS Biological Opinion, through adoption of the 1995 FCFPS Biological Opinion, established scientific evidence why the flow targets must be met as the minimum to avoid jeopardy to listed stocks. Meeting flow targets must be given a higher priority than meeting minimum elevations in reservoirs at the end of August and not the other way around as stated by the DWMP.

Adaptive management is not, as described in the DWMP, "…. The concept that the operation of the system should be adjusted based on acquired knowledge about current conditions in the system…" but is instead involves management actions that will increase the ability to discriminate between alternative states of nature (Hilborn 1987). This requires that exploratory, probing actions be employed that provide information about the true state of nature. An example of this probing could be that no fish are transported in an average flow year. The final WMP should reflect this difference in the use of the terminology. We concur with the ISAB (2003) that, "… decisions to implement actions that have any potential for adversely affecting an ESU will be required to satisfy a burden of proof that no harm is likely to be done as a result of the action."

We disagree with the statement that, "…[t]he use of water for any one fish species or project purpose will most likely affect the amount of water available for other fish species or project purposes." This is not correct. For example, storage added to natural runoff will provide good migration conditions for a particular year class for all anadromous fish stocks that are present. On the other hand, filling of reservoirs for recreational purposes, such as boat races, will increase water particle travel time through those reservoirs and delay fish migrations. The final WMP should correct this broad, incorrect statement.

Because chum spawning requirements affect storage and refill for all anadromous fish the following year, a precautionary approach should be used when setting chum flows in November and December. Preseason forecasts, groundwater storage and the previous year's runoff and meteorological conditions should be carefully considered when setting minimum chum flow spawning regimes. For example, the University of Washington Climate Impacts Group has projected a 110 MAF January- July runoff at The Dalles for 2004, while CRITFC has independently projected a 104 MAF runoff for the same period. Use of this information and the status of deficient groundwater supplies from the below normal runoff in 2003 supports limiting minimum chum spawning flows below Bonneville Dam to 120 kcfs. Power peaking from load following tends to complicate chum spawning and the maintenance of flows to protect chum redds. CRITFC strongly encourages the Corps and the other federal operators to consider reducing load following at Bonneville Dam to reduce these impacts.

The 2000 FCRPS Biological Opinion requires flow and spill measures to increase the survival of listed anadromous fish in order to avoid jeopardy and to meet tribal trust obligations, since these fish must pass many dams and reservoirs. The action agencies must consult, not coordinate, with NMFS, USFWS and the tribes on all aspects of river operations that affect this very high priority. The final WMP should reflect these responsibilities.

Section 2.2: Conflicts

In order to meet the 2000 Biological Opinion river operations requirements and other requirements, flood control rule curves should be modified. There is additional flood control space located in Canadian reservoirs that is available for purchase that could be utilized as part of this modification.[17] The DWMP fails to include relaxing flood control management in Libby, Dworshak, Brownlee and other storage reservoirs in the upper Snake River. Further, several state-of-the-art advanced weather and climate diagnostic tools are available to be used to modify flood control, especially when conducting long-range water planning. [18] These include: probabilistic streamflow and climate forecasts, multivariate ENSO (El Nino Southern Oscillation) index, ENSO Risk Model, and sea-surface temperature departure analysis. As mention above, the University of Washington Climate Impacts Group now produces a one-year lead ensemble forecast for the Columbia at The Dalles that should be considered. A

[17] This space of 500 kaf, is noted in the 1995 FCRPS Biological Opinion.
[18] RPA Number 35 in the 2000 FCRPS Biological Opinion specifies use of these new technologies that, "….[w]ould enhance system response and afford greater precision in system flood control operations". To our knowledge, the federal operators are not using available technologies that could make available more fish flows.

comprehensive package of the above climate forecast tools is needed to better manage all Columbia Basin reservoirs. These methods are recommended in the 2000 FCRPS Biological Opinion and should be included in the final plan.

Section 2.2.2: Spring Flows vs. Project Refill

CRITFC continues to advocate for a natural peaking flow or normative hydrograph concept. For the past several years we have offered the federal operating agencies a detailed water management plan that meets the dual objectives of a peaking hydrograph and meeting reservoir refill levels. We have yet to receive any written comments on these plans. Again, we ask the federal operators to review our River Operations plans and consider using them as a paradigm to meet spring and summer flows and reservoir elevations.

Section 2.2.3: Chum Tailwater Elevations vs. Spring Flows

We responded to this issue in our above comments.

Section 2.2.4: Sturgeon Pulse vs. Summer Flows

We are unsure as to how the sturgeon operation comports with VAR-Q at Libby that is likely to occur in WY 2004. The final WMP should carefully explain this issue.

Section 2.2.5: Fish Operations vs. Other Project Uses

If non-power constraints are identified in detail and specified in the 2004 PNCA planning, there should only be minimal in-season conflicts between fish and power operations. Spill levels and flows should be clearly specified from the PNCA non-power constraint in the 2004 final WMP. Irrigation demands and recreational elevations can and should be modeled prior to the water management season to determine if conflicts will exist. In any case, they should have a lower priority than meeting fish flows under the Endangered Species Act. If preseason runoff forecasting tools are utilized and an increased level of precision and detail is applied to planning to avoid conflicts before the fish passage season begins, in-season conflicts should be minimal and all parties involved with water management actions will know beforehand what to expect.

Section 2.2.6: Conflicts and Priorities

As mentioned above, CRITFC's member tribes withdrew from the NMFS' Adapative Management Forum several years ago. The regional federal executives have a trust responsibility to meet with our member tribes' government officials before and during the fish passage season with respect to FCRPS operations.

Section 2.3: Emergencies

Short-term FCRPS emergencies that impact fish flows, spill and dam operations over a few hours or days should be avoided. If they do occur, tribal technical and policy representatives should be immediately notified and consulted and appropriate in-kind mitigation should be implemented as soon as possible. In no case should fish operations be interrupted due to financial reasons such as poor financial planning.

Section 4.1.1: Reservoir Passage

The Corps operated Lower Snake reservoirs to MOP+1.5 in 2003, contrary to the Biological Opinion. CRITFC expects that Lower Snake reservoirs will be operated within one foot of MOP in 2004.

Section 5.1: Flow Objectives

The 1995 FCRPS Biological Opinion stated that the minimum flows were set as bare thresholds to avoid jeopardizing the listed salmon ESUs. If the minimum flows are not met, then the listed species are placed in jeopardy. Thus, every effort must be made to meet the minimum flows through modification of flood control, and purchase of flood control space and purchase of power produced off of the river. This includes meeting the minimum flows during weekends. To migrating salmon that need flows for critical life history functions, a weekend is the same as a weekday. The FCRPS must be adjusted to meet the needs of salmon, instead of salmon trying to exist in the face of federal operators running the FCRPS to achieve financial gains. Further, substantial numbers of juvenile salmon migrate in September (FPC 2003 unpublished data) and the majority of adult salmon and steelhead migrate in September, so serious consideration should be given to extending salmon flows and spill through September.

As noted elsewhere in these comments, in CRITFC' *River Operations Plan*, we have developed a normative peaking hydrograph that in general meets seasonal target flow objectives and reservoir refill objectives. The normative peaking hydrograph also provides the physical habitat parameters, such as sediment transport, nutrient cycling, enhancement of mainstem and estuarine riparian corridors and water quality elements critical to salmon life histories (Williams et al. 1996). Using this paradigm, with trended-and-corrected Water Supply Forecasts during the fish passage season, the Federal Operators can deliver more water in a timely manner to better coincide with the salmon's life cycle and better protect listed and unlisted salmon and other anadromous fish. We recommend that these paradigms be tested for the FCRPS in WY 2004.

Section 5.2 All Storage Projects

Available research indicates a direct flow-survival relationship for juvenile steelhead, that are spring migrants (NMFS 1998). For example, Mullan et al. (1992 in NMFS 1998) regressed smolt-to-adult returns of Wells hatchery steelhead against spring flows which indicated that flows over 140 kcfs resulted in smolt-to-adult returns that were three times higher than for lower flows. Berggren and Filardo (1993) also showed a strong relationship with steelhead migrations and increased flows. Under low flows in 2001, only 4% of Snake River steelhead were estimated to survive, the survival rate in 2002, a near normal runoff year, was about 26%. All

efforts, described above, must be made to achieve spring flows and reservoir refill. All of these elements should be included in the final WMP.

Brownlee and upper Snake reservoirs are not listed in this section. In the final WMP, these storage reservoirs should be listed and operations for fish should be specified. Included in these specifications should be the steps that Reclamation is taking to guarantee that the 427 Kaf of upper Snake flow augmentation will be delivered in a timely manner for 2004 fish migrations.

Section 5.8.3: Dworshak Summer Operations

Water from the upper Snake reservoirs and the Hells Canyon Complex should augment natural flows. BPA should enter into a water-power swap with Idaho Power to provide timely summer flow augmentation from the Complex. Dworshak should be prioritized for temperature control, not flow augmentation. Summer drafts should be limited to 1535 feet by August 31 unless additional water is needed for temperature control. Dworshak should be targeted for refill to msl 1600 by June 1 or earlier and be targeted for msl 1520 feet by mid-to-late September. A monitoring program should be put in place to evaluate effectiveness of Dworshak operations. The Corps should provide the Nez Perce Tribe with financial resources to protect cultural sites and resources during reservoir draw downs. All of these elements should be included in the final WMP.

Section 6.0 Hydrosystem Substrategy 2.3: Spill operations for project passage

The final WMP should describe the 120% total gas pressure as conservative, because, among other things, salmon can and do achieve depth compensation in the river from elevated levels of dissolved gas. This comports with the relevant regional research (Backman et al. 2002 and Backman and Evans 2002), a risk assessment by the regions' fishery managers (Columbia Basin Agencies and Tribes 1995) and the water quality appendix to the 2000 FCRPS Biological Opinion. All of these indicate that total dissolved gas levels cause little harm up to 125% TGP. Thus, spill management should not be overly concerned about some excursions above 120% TGP.

Recent data obtained from turbine survival and transportation studies at McNary Dam indicate that turbine mortality of summer migrants is very high and that transportation, with respect to smolt-to-adult returns is at best the same as in-river passage may be worse. Serious consideration to implementing a spread-the-risk passage action [19] at McNary for summer migrants should be included in the final WMP.

Recent data for spill at Bonneville Dam indicates that adult fallback is not substantially affected by daytime spill. The final WMP should incorporate a 24-hour spill program at Bonneville without a daytime spill cap.

[19] This action would entail summer spill at McNary as necessary to pass 50% of summer migrants over the spillways.

Bonneville spill for Spring Creek National Hatchery fall chinook is not mentioned in this section. The final WMP should include a 3-7 day spill program in March to protect this stock of international importance.

Section 7.1.3: Libby Storage Reservation Diagram

The December 31 preemptive draft at Libby to msl 2411 feet should not be implemented in this year to leave additional water in storage for WY 2004. The final WMP should contain all work that the Corps has accomplished to modify the December 31 flood control draft point.

Section 7.9: Dworshak Draft to 1500 feet

CRITFC does not support any draft below msl 1520 feet. Drafts below this level may reduce refill probabilities the following year and cultural resources are particularly exposed at drawn down elevations and are vulnerable to vandalism and theft.

Section 7.10: Other Reclamation Water Management Actions

The final WMP should incorporate, in detail, what specific actions will be taken in 2004 to reduce illegal water spreading. The Columbia Basin Institute, in its 1994 report on the Columbia Basin Irrigation Project, identified 800 to 1000 Kaf, out of the 2.8 Maf being diverted by the Bureau of Reclamation, that is illegally being misused by some irrigation districts. The upper Snake contribution from Reclamation reservoirs should be specified in the final WMP as a minimum of 427 Kaf.

Section 12.4.1: Kokanee—Grand Coulee

The upper Columbia Tribes have indicated to us that Lake Roosevelt needs to be at msl 1283 by the end of September to allow kokanee spawning access to tributaries. Filling to elevation 1285 feet by October 1 is not necessary for kokanee spawning and such refill could reduce lower river mainstem flows in September that would negatively impact CRITFC' member tribes treaty fisheries.

12.5 Hanford Reach Protection Flows

Flow fluctuations from Grand Coulee and Chief Joseph projects can overwhelm efforts of the mid-Columbia public utility districts to reregulate and stablize flows into the Hanford Reach. Stable flows in the Reach are vital to protect millions of emerging and migrating fall chinook from stranding and entrapment. The federal operators should work with the fishery managers to limit flow fluctuations during the susceptibility period from late March until early June. These issues should be specifically detailed in the final WMP.

Section 12.9.1: Tribal Fishing

CRITFC's member tribes' treaty fisheries occur in all of Zone 6 (Bonneville to McNary dams). Pool elevation restrictions and steady flows should be provided during tribal fisheries for

all of Zone 6, not just Bonneville Pool. The federal operators have a trust and treaty responsibility to provide this operation. The final WMP should specify these requirements.

Conclusion

CRITFC appreciates the opportunity to review and comment on the 2004 DWMP. We anticipate that the federal agencies will consider and adopt our recommendations for the final WMP. Should you have questions about these comments, please contact Kyle Martin or myself at (503) 238-0667.

Sincerely,

/s/
Robert Heinith
Hydro Program Coordinator

CC: Commissioners, Tribal staffs, tribal attorneys, CBFWA Fish Managers, Regional Executives

References:

Backman, T.W.H., A.F. Evans, M.S. Robertson and M.A. Hawbecker. 2002. Gas bubble trauma incidence in juvenile salmonids in the lower Columbia and Snake Rivers. North American Journal of Fisheries Management. 22:965-972.

Backman, T.W.H. and A.F. Evans. 2002. Gas bubble trauma incidence in adult salmonids in the Columbia River Basin. North American Journal of Fisheries Management. 22:579-584.

Berggren, T.J. and M. Filardo. 1993. An analysis of variables influencing the migration of juvenile salmonids in the Columbia River Basin. North American Journal of Fisheries Management 13:48-63.

Budy, P., G.P. Thiede, N.Bouwes, C.Petrosky and H. Schaller. 2002. Evidence linking delayed mortality of Snake River Salmon to their earlier hydrosystem experience. North American Journal of Fisheries Management. 22:35-51.

Columbia Basin Agencies and Tribes. 1995. Spill Risk Assessment. Columbia Basin Fish and Wildlife Authority. Portland, Oregon.

FPC (Fish Passage Center). 2003. Unpublished data on juvenile salmon migration timing in the Columbia River. Portland, Oregon.

Hilborn, R. 1987. Living with uncertainty in resource management. North American Journal of Fisheries Management. 7:1-5.

ISAB (Independent Scientific Advisory Board). 2003. Review of flow augmentation:update and clarification. Report 2003-1 to the Northwest Power Planning Council, National Marine Fisheries Service and Columbia River Basin Indian Tribes. Portland, Oregon.

Lichatowich, J. and S. Cramer. 1979. Parameter selection and sample sizes in studies of anadromous salmonids. Information Report Series, Fisheries. Number 80-1. Contract DACW-57-C-0027 to the Corps of Engineers. Oregon Department of Fish and Wildlife. Portland, Oregon.

Nez Perce, Umatilla, Warm Springs and Yakama Tribes. 1995. *Wy-Kan-Ush-Mi Wa-Kish-Wit. Spirit of the Salmon.* The Columbia River Anadromous Fish Restoration Plan. Columbia River Inter-Tribal Fish Commission. Portland, Oregon.

NMFS. 1998. Supplemental Biological Opinion on Operation of the Federal Columbia River Power System including the Smolt Monitoring Program and the Juvenile Fish Transportation Program, during 1998 and future years. Seattle, Washington.

Williams, R. and eleven co-authors. 1996. *Return to the River*. Restoration of salmonid fish in the Columbia River ecosystem. Northwest Power Planning Council. Portland, Oregon.